

never before noted at this station, which fact is verified by persons who have resided in San Diego for the past 40 years. Very rarely and at long intervals light snow has been seen on the summit of San Miguel Mountain, 15 miles distant. Snow is frequently seen on the Cuyamaca Peaks, 45 miles to the northeast, and occasionally on Lyons peak, 35 miles eastward. But accompanying this storm, snow varying in depth from two to five inches was reported from the low hills at El Cayon, Poway, Bernardo, and other points within 15 to 25 miles of station, "where such a thing was never before experienced." The magnitude of the fall of rain and snow was such, that 12 hours from the commencement of the storm San Diego river began flowing into False Bay, a "change almost unprecedented." In this connection the following comparative statement of January rainfalls will be found of interest: 1871, 0.69 inch; 1872, 0.99; 1873, 0.44; 1874, 3.11 inches; 1875, 2.38; 1876, 2.47; 1877, 1.05; 1878, 1.45; 1879, 3.54; 1880, 0.61; 1881, 0.52; 1882, (to date, January 13th) 3.02 inches. Oswego, N. Y., 27th, about 5 a. m., severe wind storm, considerable damage to telegraph and telephone wires; buildings unroofed, fences and trees blown down and much other damage caused; severest gale experienced for several years. Thompsonville, Conn., 27th, several buildings unroofed and considerable damage caused to farmers in the surrounding country. Stamford, Conn., 27th, one large building demolished and much damage to trees, fences and houses. Brattleboro, Vt., 27th, trees uprooted and broken down and several buildings demolished. North Hinsdale, Vt., 27th, buildings unroofed and telegraph and telephone wires rendered useless. Chesterfield, Vt., 27th, buildings blown down and forest trees uprooted. Westfield, Mass., 27th, considerable damage to buildings, fences and shade trees. Joplin, Mo., 15th, very heavy wind storm, demolishing trees, fences and out-buildings. Troy, N. Y., 27th, heavy westerly gale, causing much damage to property. Lansingburg, N. Y., 27th, several buildings unroofed. Castleton, N. Y., 27th, buildings unroofed and other property considerably damaged. Mineville, N. Y., 27th, several buildings blown down and other property damaged. Wilmington, Vt., 27th, considerable damage to trees and buildings. Marlboro, Vt., 27th, very heavy wind storm, causing much damage to property. Keene, N. H., 27th, several buildings blown down and quite a number unroofed. Winchester, N. H., 27th, large number of barns unroofed and houses partially demolished. Greenfield, Mass., 27th, several buildings unroofed and blown down. Schools were closed from fear of damage to buildings. Holyoke, Mass., 27th, considerable damage to property by the unroofing of buildings and the destruction of trees and fences. Southwick, Mass., 27th, buildings unroofed and otherwise damaged. Lewiston, Me., 27th, considerable damage to windows, fences, signs, chimneys and church steeples. Burlington, Vt., 27th, heaviest wind storm for many years; great destruction of property by the unroofing and blowing down of buildings; large trees uprooted or broken off. The ice in Burlington bay and Lake Champlain was swept out of sight with "amazing rapidity." Much havoc took place in the various lumber yards. Pittsfield, Mass., 27th, 9 a. m., very heavy wind storm, unroofing buildings, destroying trees and causing considerable damage in the surrounding country. In the city business was almost entirely suspended, "horses and sleighs were blown prostrate as the gale struck them and the streets were strewn with large quantities of debris." Most violent storm since the "terrible tornado" of July 16th, 1879. Saratoga, N. Y., 27th, heavy wind storm during early morning proving very destructive in surrounding country. Rockland, Me., 27th, several buildings unroofed and some damage to shipping in harbor. Chelsea, Me., 27th, several buildings demolished. East Concord, N. H., 27th, considerable damage to property. Chicopee, Mass., 27th, bridge over the Connecticut river destroyed; several buildings damaged. Lynn, Mass., 27th, several buildings unroofed and otherwise damaged. Rochester, N. H., 27th, several buildings damaged and other property destroyed. Cheshire, Mass., 27th, heavy wind storm; steam engine house

and ice-houses, the property of the Housatonic Ice Company were blown down; several other buildings completely demolished. Loss to property over \$5,000. North Adams, Mass., 27th, three large brick buildings aggregating over 800 feet in length, belonging to the Zylorite Works, were completely demolished. Newburyport, Mass., 27th, several buildings unroofed and otherwise damaged. Nashua, N. H., 27th, very heavy wind storm, considerable damage to property. Springfield, Mass., 27th, heavy wind storm about 10 p. m., considerable damage in city and surrounding country. West Turin, N. Y., 27th, considerable property destroyed. Naumburg, N. Y., 27th, barns unroofed and other buildings badly damaged; loss of property in vicinity quite severe. The gale was accompanied by rain, which began about 2 p. m. "The western sky was very dark and immense dark masses of cloud passed rapidly from west to east during the storm." Rondout, N. J., 27th, houses and other buildings unroofed, fences demolished and trees uprooted; severest wind storm for several years. Along the line of the Ulster and Delaware R. R. a great many telegraph poles were "broken off or torn out of the ground." Ancram, Dutchess, Co., N. Y., 27th, large destruction of property in town and surrounding country. Winthrop, Me., 27th, heavy westerly gale; considerable damage to property. Ballston Spa, N. J., 27th, heaviest wind storm experienced for several years; much damage to property. Bloodville, N. J., 27th, very heavy wind storm; buildings damaged. Rock City, N. Y., 27th, heavy wind storm; considerable property destroyed. Wabash, Ind., 26th, buildings unroofed, trees and fences blown down. Fort Wayne, Ind., 26th, heavy westerly gale, damaging buildings and other property. Grand Haven, Mich., 26th, several buildings and other property damaged during a heavy westerly gale.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for January, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 83.18 per cent. The percentages for the four elements are: Weather, 81.32; Direction of the Wind, 76.27; Temperature, 86.60; Barometer, 88.52 per cent. By geographical districts they are: For New England, 84.0; Middle Atlantic States, 88.0; South Atlantic States, 83.6; Eastern Gulf States, 82.1; Western Gulf States, 80.7; Lower Lake Region, 87.7; Upper Lake Region, 83.6; Tennessee and the Ohio Valley, 85.4; Upper Mississippi Valley, 81.9; Lower Missouri Valley, 76.7; Northern Pacific Coast Region, 83.3; Middle Pacific Coast Region, 82.1; Southern Pacific Coast Region, 85.3. There were 119 omissions to predict (40 being due to the absence of reports from the Pacific coast) out of 3,813, or 3.12 per cent. Of the 3,694 predictions that have been made, 198, or 5.36 per cent. are considered to have entirely failed; 200, or 5.42 per cent. were one-fourth verified; 437, or 11.83 per cent. were one-half verified; 231, or 6.25 per cent. were three-fourths verified; 2,628, or 71.14 per cent. were fully justified, so far as can be ascertained from the tri-daily reports.

Cautionary Signals.—97 Cautionary signals were displayed during the month of January, 1882, of which 94, or 96.90 per cent., were fully justified by winds of twenty-five miles per hour, or over, at or within a radius of 100 miles of the station. 109 Off-shore signals were displayed, of which 80, or 73.39 per cent., were fully justified; 94 or 86.23 per cent., were justified as to direction; 106, or 97.24 per cent., were justified as to velocity. Twenty-two Off-shore signals were changed from Cautionary. Two Northwest signals were displayed, both of which were fully justified. 208 signals of all kinds were displayed, of which 176, or 84.61 per cent. were fully justified. The above does not include signals ordered at 69 display stations, where the velocity is only estimated. 147 winds of 25 miles or over, were reported, for which no signals were ordered. 34 signals were ordered late.

NAVIGATION.

Stage of Water in Rivers.—In the table on the right-hand

side of chart No. III are given the highest and lowest stages of water as observed at Signal Service stations during the month of January, 1882. Except throughout the Ohio Valley and Tennessee, embracing the Ohio, Cumberland and Tennessee rivers, and a portion of the central Mississippi, the rivers have remained at a moderate stage throughout the month. In the rivers above named the changes have been remarkable, and in one instance unprecedented, as in the case of the Cumberland at Nashville, where the rise reached a point never before recorded, being, on the 22d, 54 feet and 7 inches above low-water mark, or 12 feet and 7 inches above the danger-line. The very serious floods accompanying the heavy rises in these rivers are fully described elsewhere in the REVIEW under the head of *Floods*. The Red river reached its highest stage at Shreveport on the 31st, water within 2 feet and 9 inches of the danger-line. The Arkansas reached its highest stage at Little Rock on the 18th and 19th. At most stations on the Missouri the river was frozen over throughout the month. The Mississippi above Dubuque, remained frozen; below that station the highest stage was reached, with few exceptions, on the 30th and 31st. At four stations the water rose above the danger-line, as follows: Cairo, 7 feet and 8 inches; Memphis, 11 inches; Vicksburg, 22 inches, and New Orleans, 1 inch. In the Ohio the highest stage was reached between the 15th and 28th, and all stations reported rises above the danger-line of from 18 to 27 inches. In the Cumberland, Tennessee, Monongahela and Savannah rivers the highest stages were reached between the 18th and 28th, and in the two former were above the danger-line from 112 to 151 inches.

Ice in Rivers and Harbors.—*Mississippi River*: Le Claire, Ia., 16th, river frozen over opposite city and at the head of the upper rapids; ice 10 inches thick. Keokuk, 1st, full of floating ice; steamers between this point and St. Louis gone into winter quarters; navigation closed; 3rd floating ice. Davenport, 1st to 7th, 9th to 27th, 30th, 31st, floating ice; 8th, 28th, river clear of ice. Burlington, Ia., 1st to 6th, 9th, 10th, 13th to 19th, floating ice; 7th, 11th, clear of ice. Dubuque, 1st, ferry boat stopped by the ice; 13th, frozen over; 18th, teams crossing on the ice. La Crosse, frozen over during the month. St. Paul, frozen over during the month. St. Louis, 1st to 4th, 6th, 9th, 10th, 20th, 22d, 30th, 31st, floating ice. Muscatine, Ia., 28th to 31st, river closed by ice. *Missouri River*: Yankton, frozen over during the month. Omaha, frozen over during the month. Leavenworth, 1st to 6th, 16th to 20th, 22d to 26th, 29th to 31st, floating ice; 7th, 21st, 27th, clear of ice. *Republican River*: Clay Centre, Kan., 28th, frozen over, ice eight inches thick. *Kennebec River*: Gardiner, Me., 2d, river closed by ice. *Yuba River*: Marysville, Cal., 13th, river full of floating ice; coldest weather for years. *Des Moines River*: Des Moines, 17th, river partly covered with ice. *Forest Lake*: Madison, Wis., 2d, frozen over. *Yellowstone River*: Terry's Landing, Dak., 13th, river closed by ice. Fort Keogh, 5th, river frozen over. *Big Horn River*: Fort Custer, 9th, river closed by ice. *Embarrass River*: Charleston, Ill., 5th, river frozen over; 24th, ice 3 to 5 inches in thickness. *Rock River*: Rockford, Ill., 1st, river frozen solid. *Sault St. Marie River*: Fort Brady, Mich., 1st, ice forming on river; 3d, river frozen over. *Lake Ontario*: Madison Barracks, N. Y., 2d, bay frozen over. *Niagara River*: Buffalo, 4th, frozen over; 26th, ice breaking up; 27th, gorging. Fort Niagara, 23d, 31st, river full of floating ice. *Lake Huron*: Port Huron, 23d, Lake Huron Bay covered with ice-floes; 24th, ice bridge formed across the bay from Fort Gratiot Light-house to Point Edwards; 27th, ice bridge broken. Alpena, 1st, Thunder Bay frozen over, navigation closed. *Grand River*: Grand Haven, 4th, frozen over; 14th, full of ice; 25th, frozen over with exception of channel, which was kept open by steamers. *Lake Superior*: Duluth, 4th, lake full of broken ice as far as the eye could reach; 8th, clear of ice; 10th, frozen over 600 feet from the docks; 15th, opened during evening; 17th, frozen; 18th, ice disappeared; 20th, frozen; 21st, clear of ice; 22d, frozen; 28th, large fields of ice went out during storm; 31st, ice melting rapidly. *Thunder Bay River*: Alpena, 1st, frozen

over, navigation closed. *Hudson River*: Peekskill, N. Y., 24th, river frozen solid for many miles to the northward; "ice cutting very active everywhere north of Catskill." Albany, 1st, 3d, floating ice; 4th, river full of ice rendering navigation dangerous; 5th, navigation closed. Poughkeepsie, N. Y., 24th, steamer Daniel S. Miller, bound for New York, became fast in the ice off Cold Spring in the Highlands. New York, 5th, considerable floating ice in North Hudson River; 29th, floating ice in river and harbor; 4th, navigation on the upper Hudson closed in consequence of ice. In 1809 the river was open until January 19th; during the last 100 years, navigation continued later than December, only eleven times, the latest cessation occurring in 1801 when navigation did not close until the 3d of February. *Chincoteague Bay*: Chincoteague, 4th, 5th, floating ice in harbor; 24th, harbor partially frozen over, navigation obstructed; 25th, ice in harbor breaking up. *Core Sound*: Cape Lookout, 22d, frozen over. *Lake Michigan*: Milwaukee, 5th, lake frozen. Chicago, 3d, lake frozen; 8th, clear of ice. *Black River*: Port Huron, 1st, frozen over; 17th, ice 7 inches thick. *St. Clair River*: Port Huron, 2d, light floating ice; 4th, 5th, 17th, 18th, 19th, 22d, 23d, 24th, 27th, 29th, 30th, 31st, floating ice. *Maumee River*: Toledo, 2d, frozen over; 8th, ice breaking up; 13th, floating ice; 14th, frozen over. *Cuyahoga River*: Cleveland, 2d, frozen over; 4th, 5th, 18th, floating ice; 6th, clear of ice; 23d, frozen over; 25th, ice broken up by tugs. *Lake Erie*: Cleveland, 4th, 5th, 18th, lake full of ice as far as eye could reach. Erie, 1st, ice formed in harbor to a depth of 8 inches; 25th, ice breaking up causing considerable damage to the breakwater. *Lake Champlain*: Burlington, 5th, lake frozen between the docks; 23rd, navigation closed. *Monongahela River*: Pittsburgh, 4th, 25th, 26th floating ice; Morgantown, 4th, partly frozen over. *Detroit River*: Detroit, 2d, floating ice. *Sandusky Bay*: Sandusky, 1st, frozen over during night, navigation suspended; 10th, ice breaking up; 12th, clear of ice; 14th, frozen over. *Penobscot River*: Bangor, 2nd, navigation closed. *Quinnipiac River*: New Haven, 4th, harbor and river frozen over. *Connecticut River*: New Haven, 4th, navigation closed, a later date than for past 40 years; steamer Granite State from New York to Hartford, caught in the ice at Lynn. Springfield, 4th, ice forming rapidly; 5th, river closed; 15th, ice melting and breaking up.

Floods.—The extraordinarily heavy rains in Tennessee and extending thence southwestward into the northern portions of the West Gulf States caused very serious floods and enormous destruction of property. The destructive work of high water as herein noted is confined to the last half of the month, and in several instances to the last week, which shows how sudden and extremely heavy must have been the precipitation. In many sections of the flooded district it has no parallel during the past 50 years. *Alabama*: Montgomery, 21st, river slowly falling, no special danger from the flood. Mobile, 19th, lower portion of the city inundated by the overflow of Tombigbee river. Tuscaloosa, 19th, river 56 feet above low water mark and the water still rising. Bridgeport, 20th, river remained stationary for several hours but commenced rising during the night; damage to property slight. Decatur, 21st, heaviest rain of the season; river 25 feet above low water mark and rising slowly; river six miles wide and lacks only three feet of reaching the high water mark of 1867. *Arkansas*: Hopefield, 28th, most of the town submerged; great destruction of property; loss to private parties very heavy. *Georgia*: Rome, 21st, the heavy rains of the past week caused rapid rises in all streams and in some cases serious floods. *Illinois*: Cairo, 21st, with two exceptions the Ohio river at this point was higher than at any time during the past ten years. At 4 p. m., river 45.6 feet above low water mark and rising slowly. The following are the dates and heights of the highest water at this station during the past ten years: 1872, April 20th, 29.2 feet; 1873, February 26th, 41.3 feet; 1874, April 26th, 47.4 feet; 1875, April 21st, 33.8 feet and August 8th, 45.1 feet; 1876, April 7th, 46.4 feet;

1877, April 15th, 40.6 feet; 1878, March 17th, 35.9 feet; 1879, January 26th, 36 feet; 1880, March 23d, 44.5 feet; 1881, April 20th, 45.9 feet; 1882, January 21st, 45.6 feet. *Louisiana*: New Orleans, 19th, high water reported from many sections of the State. The Atchafalaza river overflowed its banks submerging the adjacent low lands. The flood of Big Black river spread in every direction; about 30 miles of the Chicago, St. Louis and New Orleans R. R. under water; many culverts destroyed and much of the road bed washed away. 28th, a crevasse, 75 feet wide and 3 feet deep formed in the O'Brien levee, just below the Quarantine station; country flooded for a distance of two miles back. 29th, crevasse formed at Lockport, Bayou-la Fourche, gap 28 feet wide and 20 feet deep. *Mississippi*: Corinth, 20th, the tracks of the Memphis and Charleston R. R. submerged, and travel suspended. Canton, 21st, from this station to Grenada, a distance of 87 miles, the Jackson R. R. has been abandoned. Ten to fifteen miles of the road was submerged to a depth of from two to four feet. Rain has fallen almost incessantly in this portion of the State for the past two weeks; Big Black river is remarkably high, and much damage has resulted from its overflow. Goodman, 19th, lower portion of city inundated, the turnpike road destroyed, and the bridge over the Big Black river washed away. *Pennsylvania*: Bradford, 27th, heavy rains and ice gorges in the creeks caused serious flooding in the northern and eastern sections of the city. Many buildings surrounded by water, effecting considerable loss of property. *Tennessee*: Nashville, 10th, from the continued and heavy rains of the past few days low lands flooded in northern part of city to a considerable extent; river rising rapidly and filled with heavy drift-wood. 11th, river rising slowly; large quantity of logs carried away by the high water; heavy drift-wood in river; 9 p. m., river 41 feet and 8 inches above low water mark, or 4 inches below the danger-line. 12th, with continued rains river rose rapidly, reaching 42 feet and 2 inches above low water mark, or 10 inches above the danger-line. All the lower portions of the city and contiguous bottoms flooded. About 200 families forced to abandon their homes. An immense quantity of lumber and saw-logs have been swept down the river, and over 3,000 walnut logs lost in one of the tributaries of the upper Cumberland. 13th, river rising rapidly, being 46 feet and 9 inches above low water mark, or 5 feet and 5 inches above the danger-line; heavy drift-wood in river. The first story of houses in the flooded portion of the city, completely under water; people obliged to make use of improvised rafts in order to leave their dwellings. 14th, river 47 feet and 8 inches above low water mark or 6 feet and 4 inches above the danger-line; large amount of drift-wood in river. All mills on the Edgefield side of the city surrounded by water and their operations suspended. The Bucket Factory, Brick Yards, Southern Pump Factory and Indiana Mills inclosed by water and all operations suspended. Large number of houses flooded and deserted. 15th, river 48 feet and 6 inches above low water mark or 7 feet and 2 inches above the danger-line. Great suffering among the people who were compelled to vacate their homes. Each additional rise of but one inch drove many people from their houses; over 300 families now homeless. 16th, river 48 feet and 10 inches above low water mark, or 7 feet and 6 inches above the danger-line, and 5 feet 1 inch below the high water mark of 1847. Many additional houses submerged and families left homeless. 17th, 6 a. m., river 49 feet and 11 inches above low water mark, or 8 feet and 7 inches above the danger-line; 9 p. m., 59 feet and 11 inches, or 9 feet and 7 inches above the danger-line and 4 feet and 8 inches below the high water mark of 1847. All communication cut off from the pikes leading into the city; great suffering in the flooded district. 18th, 6 a. m., river 51 feet and 2 inches above low water mark, or 9 feet and 10 inches above the danger-line and 4 feet and 5 inches below the high water mark of 1847; 2.21 p. m., river stationary. During the afternoon and evening another heavy rain occurred when the river began to rise again. 19th, river 51 feet and 7 inches and still rising; 1.21 p. m., 51

feet and 11 inches; 9 p. m., 52 feet and 4 inches; over 500 families now homeless and the consequent suffering extreme; 10 p. m., river 53 feet and 4 inches above low water mark, or 12 feet above the danger-line and 2 feet and 3 inches below the high water mark of 1847. Although the river did not reach the highest point on the gauge as recorded in 1847, the volume of water was considerably greater. 20th, 6 a. m., river 52 feet and 5 inches, or a fall of 11 inches in the past 8 hours. All communication on streets leading out to North Nashville completely cut off; 9 p. m., communication with East Nashville entirely cut off and all railroad travel suspended except on the Louisville and Nashville Railroad and the Chattanooga and St. Louis Railroad. All other railroads in southern part of State submerged and unserviceable; midnight, river again rising rapidly, heavy rains still continue at intervals. 21st, 6 a. m., 52 feet and 11 inches; 1.21 p. m., 53 feet and 11 inches; 9 p. m., 53 feet and 9 inches. Many valuable rafts of pine and walnut were swept from the various lumber yards in the city. More than one-fifth of the population of the city have been compelled to move from their homes and places of business. Over 500 houses now under water. 22d, river 54 feet and 7 inches above low water mark or 13 feet and 3 inches above the danger-line and 1 inch above the great rise of 1847. Communication with north Nashville now entirely cut off and water 3 feet deep on North College street. 23d, 6 a. m., 54 feet and 2 inches; 9 p. m., 53 feet and 6 inches; river fell slowly throughout the day. Many small houses floated down the river during the past two days. 24th, 1.21 p. m., river 52 feet and 11 inches and slowly falling. 25th, 1.21 p. m., river 53 feet and 9 inches. 27th, 1.21 p. m., river 50 feet and 4 inches. 28th, 1.21 p. m., river 49 feet and 11 inches. 29th, 1.21 p. m., river 50 feet and 1 inch. 30th, 1.21 p. m., river 49 feet and 4 inches. 31st, river falling rapidly. The estimated loss of property in and about the city of Nashville, resulting from the overflow of the Cumberland, is placed at fully \$400,000. Many farms in the surrounding country were entirely flooded and the spring wheat crop will prove a complete failure. The entire river from its mouth to the head of navigation was above banks and continued above the danger-line for 19 days. For many miles around the entire country was flooded and all railroad and other travel suspended. The following is a comparative record of the highest water at Nashville for a period of several years: 1826, April, over 50 feet (?); 1847, March 18th, 54 feet, 6 inches; 1862, January, 50 feet, 3 inches; 1867, March, 51 feet, 1 inch; 1872, April 15th, 46 feet, 3 inches; 1873, February 21st and 22d, 39 feet; 1874, April 16th and 17th, 49 feet, 2 inches; 1875, March, 2d, 41 feet, 4 inches; 1876, January 29th, 4 feet, 6 inches; 1877, January 22d, 40 feet, 4 inches; 1878, April 26th, 27 feet, 3 inches; 1879, January 19th, 41 feet, 4 inches; 1880, March 17th, 46 feet, 5 inches; 1881, January 24th and 25th, 33 feet; 1882, January 22d, 54 feet, 7 inches. Johnsonville, 21st, river nine miles wide and rising rapidly; low lands flooded. 25th, water reached the iron rails of the R. R. bridge; houses, logs, lumber and debris of all kinds floating down the river in large quantities. The population numbering about 700 were driven from their homes, and the entire settlement was submerged. Camden, 21st, low lands submerged to a depth of about 5 feet; water rose 23 inches in past 24 hours. Pulaski, 20th, Richland river and other streams overflowed. Great damage throughout the country; much farm property destroyed and several villages inundated. Danville, 20th, Tennessee river overflowed, carrying away the bridge of the Louisville and Memphis R. R. Burnside, 21st, river 35 feet above low-water mark, and rising at the rate of 18 inches per hour. Clarksville, 20th, river overflowed; all houses on Front street flooded, some to a depth of three feet. Water Works surrounded, the boilers submerged, and all operations ceased. Much inconvenience and considerable loss has been experienced by mills and factories. On each side of Tennessee river, for a distance of several miles, water covered railroad tracks to a depth of three feet. In many warehouses water from two to five feet deep. River within 20

inches of the great flood of 1847. Cumberland City. 20th, railroad track 20 inches under water; all trains between this point and Paris, 65 miles distant, abandoned. Memphis, 15th, occasional drift in river. 16th, river overflowed opposite the city. 21st to 25th, heavy drift in river. 25th, river rising rapidly and now 34 feet 2 inches above low-water mark. 26th, river 34 feet and 4 inches above low-water mark and 4 inches above the danger-line. Track of the Memphis and Little Rock R. R. partly submerged. 27th, river 34 feet and 7 inches above low-water mark and 7 inches above the danger-line, with occasional drift. Wolfe river rising rapidly and moving with a "powerful current." 28th, river 34 feet and 9 inches above low-water mark and 9 inches above the danger-line; much drift in river. 29th, intervening country between station and Marion, Crittenden, Co., Arkansas, almost entirely submerged. At the latter place water five inches higher than ever before recorded; water running through the streets; many houses flooded and others surrounded. 31st river 34 feet and 11 inches above low-water mark and 11 inches above the danger-line. Memphis and Little Rock R. R. entirely submerged; passengers and baggage transported by aid of boats. Columbia, 21st, river has been subject to a series of heavy rises since the opening of the year. Much damage sustained by farmers along the line of the river, from the flooding of fields and the washing away of fences and other property. Knoxville, 17th, river higher than for many years past. Heavy land-slides occurred on the East Tennessee, Virginia and Georgia R. R. 28th, water in First creek higher than ever before known. In the flats east of the city many dwellings flooded and a large amount of property surrounded by water. Chattanooga, 18th, river above the danger-line and lower portions of the city submerged. 19th, river rising. 29th, river falling.

High Tides.—Delaware Breakwater, 18th, 19th, Indianola, 22th, 26th.

Low Tides.—New Haven, 22d, very low; Newport, 23d, unusually low, water about 3 feet below mean low tide. Between Camden and Philadelphia, 23d, high winds caused lowest water on the Delaware ever known before; several ferry boats ran aground on the bar, and other boats on the lower end of Windmill Island. New York, 24th, heavy northwest gale caused extremely low tide.

Water Spouts.—Warren Co., Tenn., 27th, p. m., near the head waters of Caney creek, one of the main tributaries of the Cumberland river.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left hand side of chart of No. III. Owing to the presence of ice or the breakage of instruments observations are wanting as follows: Alpena, 1st to 31st; Burlington, Vt., 23d to 31st; Escanaba, 2d to 31st; Buffalo, 4th to 7th, 22d to 26th, 29th to 31st; Cleveland, 22d to 24th, 27th to 31st; Duluth, 4th to 7th, 10th, 17th, 20th, 22d to 31st; Detroit, 2d to 31st; Chicago, 3d to 7th, 15th to 26th, 30th to 31st; Grand Haven, 4th to 9th, 14th to 31st; Marquette, 3d to 7th, 17th to 25th; Milwaukee, 4th to 31st; Sandusky, 1st to 11th, 14th to 31st; Toledo, 1st to 31st.

ATMOSPHERIC ELECTRICITY.

Auroras.—The most remarkable display of the month because of the continuity of the line of observation and the numerous points at which the phenomenon was noted, was that of the 19th, the following stations reporting: Charlottetown, P. E. I., during the evening. Halifax, N. S., p. m. St. John's, N. B., during the evening. Fredericton, N. B., 9 p. m. Eastport, 8 p. m. to midnight; arch formed at 8.30 p. m.; 10 p. m., very brilliant, of a red, greenish tinge, dark segment below; had a wavy lateral motion from east to west. Portland, 7.30 p. m., arch extending over the entire northeastern portion of the heavens; was of a deep straw color. Mt. Wash-

ington, 7 p. m. to morning of the 20th; faint yellowish light extending from NW. to ENE. Burlington, Vt., 7 to 11.45 p. m., diffuse white light in the form of an arch; dark segment below, but not well defined. Thatcher's Island, 8 p. m. to midnight; bright streak of bluish white light in northern heavens; altitude 25° and azimuth 90°. New London, 7 to 9.30 p. m., arch well defined; altitude 20° and azimuth 15° E. to 10° W. New Shoreham, 9.15 p. m., faint arch of light; altitude 20°. Newport, 7.20 to 11.33 p. m., unusually brilliant; arch well defined from 8 to 8.50 p. m.; altitude 12° to 15° and azimuth 90°; centre of arch, bright white, with upper and lower edges tinged with red; arch reappeared at 9.30 p. m.; numerous beams rose out of the dark segment and were very bright at points where they intersected the arch. Bangor, Me., 7 p. m. to morning of 20th; during the early morning the display became very brilliant; a dense band of "leadened clouds" darkened the northern horizon; from behind the cloud bank, broad bands of the softest light streamed toward the zenith and encircled the northern sky in a gorgeous halo; disappeared only at the approach of day. New Haven, 9 p. m., very brilliant. Point Judith, R. I., 7 p. m. to morning of 20th, very brilliant. Springfield, Mass., 7 p. m., to morning of 20th, extended along the northern horizon in a direction from NNW. to ENE., altitude about 15°; dark segment below arch and well defined, being a prominent feature of the display; 9.45 p. m., several streamers shot upward near the eastern end of the arch, and later at other portions, with at times a wavy lateral motion; light constantly changing in brightness and extent of surface; at times there were two irregular parallel bands of light extending horizontally above the dark segment, separated from each other by a dark band about the density of the dark segment below the arch; after 10 p. m. the light began to fade, and the dark segment decreased rapidly in size. Agawam, Mass., 7.30 to 10 p. m., probably covered about half the northern horizon; breadth of band about 20°; no streamers. Cornish, Me., from dark to morning of 20th. Gardiner, Me., 6 p. m. to morning of 20th. Dexter, Me., visible most of night; very brilliant. Contoocookville, N. H., 9 to 10 p. m., bright arch, with dark segment below. Newport, Vt., 7 to 10 p. m. Woodstock, Vt., 8 to 9 p. m., extended across northern sky; altitude about 30°. Cambridge, Mass., 6 p. m., over dark sky; rather bright all the evening. Westborough, Mass., very brilliant. Williamstown, Mass., 7.30 p. m., bright arch, with small faint streamers above and dark segment below. Fall River, Mass., broad band in north-western sky, extending half way to the zenith; numerous streamers. Boston, 7 p. m., till after midnight, very brilliant. South Lee, Mass., 8 p. m., bright arch, with numerous streamers. Southington, Conn., 9 p. m., bright arch, with streamers. Madison Barracks, N. Y., 7 p. m. Ardenia, N. Y., 9 to 11 p. m., very brilliant. Brookhaven, N. Y., 8 to 10.30 p. m., very brilliant. Ithaca, N. Y., 8 to 11 p. m., bright arch, sharply defined with dark segment below; 10 p. m., two arches formed, were sharply defined, but quite irregular; at times the light seemed to concentrate in masses, resting on the dark segment, and again streamers shot upward to a height of 30°, with a lateral motion from west to east. North Volney, N. Y., 10.15 p. m. Palermo, N. Y., 9 p. m. Rochester, 8 to 11.15 p. m., horizontal bands of light, no dark segment below. Oswego, 7.30 p. m., to 2.30 a. m. of 20th, bright arch of light with streamers occasionally shooting to zenith; display constantly changing color from a reddish to a pale yellow. Atco, N. J., low bright arch, dark segment below, but no streamers. Somerville, N. J., 9 to 10.30 p. m., bright arch with streamers. Freehold, N. J., 7.30 to 9 p. m. Moorestown, N. J., 9 p. m., low distinct arch, no streamers. Princeton, N. J., during evening. Dyberry, Pa., 8 p. m., bright arch. Great Falls, Md., 9.15 to 10.15 p. m., bright arch with streamers. Toronto, during evening. Port Huron, 6 to 11.30 p. m., diffuse light, altitude 30°. Bellefontaine, O., 9 p. m., bright arch, with dark segment below. North Lewisburg, O., 8 p. m., long low arch. Ruggles, O., 8 to 9 p. m., diffuse light. New Cory-